

IN THE SPECIFICATION:

Please replace paragraph number [0001] with the following rewritten paragraph:

[0001] This application is a continuation of application Serial No. 09/944,471, filed August 30, 2001, ~~pending now U.S. Patent 6,610,610, issued August 26, 2003~~, which is a continuation of application Serial No. 09/639,421, filed August 14, 2000, now U.S. Patent 6,329,301, issued December 11, 2001, which is a continuation of application Serial No. 08/916,997, filed August 20, 1997, now U.S. Patent 6,103,636, issued August 15, 2000.

Please replace paragraph number [0009] with the following rewritten paragraph:

[0009] In a prior art process, described in United States Patent 5,271,798, a method for the selective etching of the alignment mark areas of the wafer is set forth to selectively etch the alignment mark areas of the wafer using a wet etching process which can be controlled and isolated to a specific area of the wafer. In the prior art process, tungsten is selectively etched locally from the alignment marks on the wafer either before or after the chemical mechanical planarization process. The wafers are flat aligned and a tungsten etch solution is introduced through an enclosed ~~etchant-etchant~~-dispensing apparatus onto low lying areas of the wafer surface which result from the alignment marks used for aligning various photolithography mask steps. Since the alignment marks are normally a few hundred microns in size and if a large amount of unused silicon area exists around the alignment marks, the alignment area constraints regarding an enclosed ~~etchant-etchant~~-dispensing apparatus and wafer are not too severe. Also, when a large amount of unused silicon area exists around the alignment marks, the tungsten plugs in the semiconductor device being formed on the wafer can be easily protected from the wet etch. Either during or after the etch, the etching products are removed and the wafers are cleaned by being rinsed in distilled water.

Please replace paragraph number [0013] with the following rewritten paragraph:

[0013] The present invention is directed to an improved process and apparatus for locally removing material from predetermined areas of the wafer, such as the wafer alignment mark areas of a silicon wafer in process during the formation of integrated circuits thereon. A process and apparatus of the present invention locally removes material from predetermined areas of the wafer, such as the wafer alignment mark areas of a silicon wafer, in process during the formation of integrated circuits thereon without contacting the area surrounding the predetermined area of the wafer, such as the alignment mark of the wafer, while maintaining the etching material within the predetermined area, such as the alignment mark area, to prevent damage to the surrounding semiconductor circuits. The process comprises the steps of aligning the predetermined area, such as the alignment marks, on the wafer to an ~~etchant~~ etchant-dispensing apparatus, positioning a portion of the ~~etchant~~-etchant-dispensing apparatus adjacent the surface of the wafer at the predetermined area, dispensing at least one etchant agent onto the predetermined area, such as the alignment mark, and removing any etching agent or cleaner or rinse material from the wafer. The apparatus for the cleaning of an area of a semiconductor wafer using a material comprising a tube having a bore therethrough and exterior wall, the tube supplying a material to ~~said~~ the area of the wafer and an annular member having an interior wall surrounding the tube, the annular member having a thin annular edge thereon for positioning adjacent a portion of the predetermined area of the wafer, such as the alignment mark area of the wafer, during the cleaning thereof, the annular member forming an annular space between the tube and the interior wall of the annular member.

Please replace paragraph number [0022] with the following rewritten paragraph:

[0022] FIG. 8 is a top view illustrating a localized ~~etchant~~-etchant-dispensing apparatus aligned to a wafer and positioned at alignment marks that reside on the wafer.

Please replace paragraph number [0024] with the following rewritten paragraph:

[0024] Referring to drawing FIG. 2, the wafer 10 is mounted in a substantially flat alignment (horizontal, perpendicular alignment) prior to the local dispersion of a wet etching agent to remove residue 13. The wet etching agent may comprise well known etching agents, such as liquid, liquid vapor, gases, etc., examples of such including ammonia, hydrogen fluoride, nitric acid, hydrogen peroxide, ammonium fluoride, etc. The etchant may be heated, if desired, by any suitable source, such as ultrasonic energy, laser heating, etc. The wafer surface overlying layer 11 must be positioned in relation to apparatus 21 such that lower thin annular edge 22, an annular type knife edge of the apparatus 21, is positioned adjacent layer 11, but not in contact with layer 11, to provide a “virtual” seal or vacuum therewith. An etching agent is introduced through a tubular member 52, a needle-like member of ~~etchant~~-etchant-dispensing apparatus 21 (also referred to as “etching apparatus” or “cleaning apparatus” 21) onto the alignment marks 12 on the wafer 10 to remove the residue 13. Since the alignment mark 12 is a few hundred microns in size and little unused area exists on the wafer 10 surrounding the mark 12, the constraints regarding the size and use of the etching apparatus are severe in order to ensure that any semiconductor circuit components in the electronic circuitry located on the wafer surrounding an alignment mark 12 are protected from the etching process. The etching apparatus 21 is an enclosed apparatus with the thin annular edge 22 thereof creating a “virtual” seal or vacuum with the underlying glass (BPSG) layer 11 by a suction being applied through annular space 56 formed between the interior annular wall of annular member 54 and the exterior wall of tubular member 52 of the etching apparatus 21. Sufficient suction is applied in the annular space 56 so that the pressure of the existing atmosphere surrounding the exterior of the thin annular edge 22 is greater than the pressure in the annular space 56 with the existing atmosphere surrounding the thin annular edge 22 being drawn into the annular space 56 between the tubular member 52 and annular member 54, thereby preventing any leakage of etchant from the annular space 56. The thin annular edge 22 of the etching apparatus 21 does not contact the surface of the layer 11, thereby preventing any damage thereto. The surrounding atmosphere of the annular member 54 flows into the gap formed between the lower edge of thin annular edge 22 and the surface of

layer 11 (illustrated by the arrows entering into annular space 56 in drawing FIG. 2) creating the “virtual” seal or vacuum between the etching apparatus 21 and the layer 11, thereby preventing any etchant material being used from flowing from the annular space 56 onto the surrounding area of layer 11 of the exterior to annular member 54. The thin annular edge 22 is located as close as possible to the surface of the layer 11 on the wafer 10 without being in contact therewith.

Please replace paragraph number [0027] with the following rewritten paragraph:

[0027] Alignment between wafer 10 and ~~etchant-etchant~~-dispensing apparatus 21 may be accomplished by any suitable well known aligning and maneuvering techniques for aligning the wafer 10 into position. Though it is preferred that the wafer is at a 90° angle, perpendicular to the etching apparatus 21, the orientation of the wafer 10 and etching apparatus 21 can be any desired position as long as the thin annular edge 22 or 22' of the etching apparatus 21 is located substantially adjacent, but not in contact with, the surface of the layer 11 on the wafer 10. Etching by-products are removed by suctioning or vacuuming them from the alignment mark 12 through annular space 56 formed between the interior annular wall of annular member 54 and the exterior wall of tubular member 52 of the etching apparatus 21.

Please replace paragraph number [0028] with the following rewritten paragraph:

[0028] Referring to drawing FIG. 3, residue 13 (shown in FIGS. 2 and 2A) has been removed from alignment marks 12 and the etching by-products removed by suction applied through annular space 56 of the etching apparatus 21. In addition to the removal of etching by-products from the alignment mark 12 on the wafer 10 using suction through annular space 56, the removal of the etching by-products may be performed during the step of removing etching residue 13 (in situ) from alignment mark 12 by flowing water, or any desired cleaning material or agent or rinsing material or agent, into the ~~etchant-etchant~~-dispensing apparatus 21 after dispensing the etching agent therethrough to have such wash the residue from the alignment mark 12. Once the etching by-product is removed, wafer 10 is then cleaned by rinsing it with deionized water or other suitable well known cleaning or rinsing agents.